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SPECIFICATION FOR TRACING CLOTH

(First Revision)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3 *January* 1987

Indian Standard

SPECIFICATION FOR TRACING CLOTH

(First Revision)

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Indian Standard

SPECIFICATION FOR TRACING CLOTH

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by Indian Standards Institution on 15 January 1986, after the draft finalized by the Treated Fabrics Sectional Committee had been approved by Petroleum, Coal and Related Products Division Council.

0.2 This standard was first published in 1962. Later three amendments were issued to modify various clauses of this standard. In this revision, the requirements for thickness of tracing cloth and packing clause have been modified. Certain changes have been made in the requirements for basic fabric and coating and amendments have been suitably incorporated. Besides the test procedure for inking and erasing test has been elaborated so as to remove any ambiguity.

0.3 This standard contains **3.1.1**, **3.3.1** and **5.1** which call for an agreement between the purchaser and the supplier.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements and the methods of sampling and test for tracing cloth for use in drawing offices.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 2244-1972† shall apply.

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*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to treated fabrics (*first revision*).

3. REQUIREMENTS

3.1 Basic Fabric — The basic fabric shall be made from thoroughly cleaned cotton. It shall be free from knots, kitties, dead cotton and other visible defects affecting its appearance or serviceability.

3.1.1 The basic fabric shall be of plain weave and, when tested according to the method prescribed in IS : 1963-1981* shall have not less than 350 ends per decimetre and not less than 320 picks per decimetre.

NOTE — The requirements of the basic fabric as stipulated are only for the guidance of the manufacturer and the consumer. They may be suitably modified by agreement between the purchaser and the supplier provided the tracing cloth satisfies requirements specified in this standard.

3.2 Coating — The basic fabric shall have been coated with a suitable composition in such a way that the material, when held at about 2 metres from an unshielded 60 watt incandescent lamp in a dark room, shall show no cracked surfaces or pin holes. The coating shall have a uniform bluish tinge throughout the surface (*see* Note). The fabric shall have been processed in such a way that one side of the tracing cloth is highly polished and the other side that is writing side shall be dull. Dull side of the tracing cloth shall permit free and adequate flow of ink without penetrating the fabrics, when put to use for drawing purposes.

NOTE — White tracing cloth may be permitted if required by the purchaser.

3.3 Finished Material

3.3.1 *Width* — The material shall be supplied in width as agreed to between the purchaser and the supplier but the tolerance limits for the width agreed upon shall be ± 2 percent.

3.3.2 The finished material shall also comply with the requirements given in Table 1.

4. TESTS

4.1 Tests shall be carried out as prescribed under **3.1, 3.2** and appropriate reference specified under col 4 and 5 of Table 1.

4.2 Quality of Reagents — Unless otherwise specified, pure chemicals and distilled water (*see* IS : 1070-1977†), shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

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‡Methods for determination of threads per unit length in woven fabrics (*second revision*).

†Specification for water for general laboratory use (*second revision*).

TABLE 1 REQUIREMENTS FOR TRACING CLOTH

(*Clauses* 3.3.2 *and* 4.1)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST, REF TO	
			IS No.	Cl No. of Appendix
(1)	(2)	(3)	(4)	(5)
i)	Thickness in mm	0·08 to 0·11	5 of IS : 7016 (Part 1)-1982*	—
ii)	Breaking strength in N, on 50 mm wide strip, *Min*		7016 (Part 2)-1981†	—
	a) Warp direction	270		
	b) Weft direction	180		
iii)	Mass of basic fabric, percent, *Min*	50	—	A-1
iv)	Moisture regain, percent by mass, *Max*	8	—	A-2
v)	*p*H of aqueous extract	5·0 to 8·0	—	A-3
vi)	Ash content, percent by mass, *Max*	0·7	—	A-4
vii)	Transparency		—	A-5
	a) Initial, percent, *Min*	60		
	b) After heat ageing, percent, *Min*	50		
viii)	Inking and erasing test	To pass the test	—	A-6

*Methods of test for coated and treated fabrics: Part 1 Determination of roll characteristics (*first revision*).

†Methods of test for coated and treated fabrics: Part 2 Determination of breaking strength and extension at break (*first revision*).

5. PACKING AND MARKING

5.1 Packing — Unless otherwise agreed to between the purchaser and the supplier, a roll shall contain 18 metres of tracing cloth wound on stiff core (*see* **5.1.1**) in such a way that the material is not damaged during transit. The rolls shall be covered with polyethylene, polypropylene, polyurethane or any other suitable material so as to protect the contents from humidity during storage. Such rolls shall finally be packed in kraft paper.

5.1.1 *Core Specification* — The core intended to be used for winding of the tracing cloth shall be of wood, paper, plastics or any other suitable material. The core shall be supported on pivots at both the ends. A piece of cloth about 10 cm wide and 100 cm long shall be placed at the centre of the core. A load of about 1·5 kg shall be hung on the loop end opposite to core and allowed to remain for 24 hours. The core shall not be deformed or ruptured during and after the tests.

5.2 Marking — Each package shall be marked with the following information:

a) Name of the material;

b) Width of roll in centimetres, and length in metres;

c) Manufacturer's name and his recognized trade-mark, if any;

d) Month and year of manufacture; and

e) Identification mark, in code or otherwise, to enable the lot of manufacture to be traced back from records.

5.2.1 The packages may also be marked with the ISI Certification Mark.

Note — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. SAMPLING AND CRITERIA FOR CONFORMITY

6.1 The scale of sampling and criteria for conformity of tracing cloth shall be as prescribed in Appendix B.

APPENDIX A

[*Table* 1, *Items* (iii) to (viii)]

METHODS OF TEST FOR TRACING CLOTH

A-0. GENERAL

A-0.1 Standard Atmospheric Conditions for Testing — All tests shall be made on material which has been conditioned in an atmosphere of 65 ± 2 percent relative humidity and at a temperature of 27 ± 2°C for not less than 16 hours.

A-1. DETERMINATION OF MASS OF BASIC FABRIC

A-1.1 Procedure — Weigh accurately about 5 g of the material and boil it for about half an hour with water. Rinse it with warm water till it is free from all soluble matter. Allow the cloth to dry. Condition the dried piece in an atmosphere of 65 ± 2 percent relative humidity and at a temperature of 27 ± 2°C (*see* IS : 196-1966*) for 4 hours and weigh.

A-1.2 Calculation

$$\text{Mass of the basic fabric expressed as percent by mass of the tracing cloth} = \frac{M_1 - (M_1 - M_2)}{M_1} \times 100$$

where

M_1 = mass in g of the tracing cloth taken for the test, and
M_2 = mass in g of the washed fabric.

A-2. TEST FOR MOISTURE REGAIN

A-2.1 Procedure — Weigh accurately about 5 g of the material in a dry flat-bottomed weighing bottle of 100-ml capacity. Keep this in an air-oven maintained at 105 ± 2°C till constant mass is obtained.

A-2.1.1 Obtain the loss in mass as the difference between the initial mass of the material and the mass of the material after drying. Express the loss in mass as a percentage of the constant mass of the material after drying, obtained as in **A-2.1** and report it as moisture regain.

A-3. TEST FOR *p*H

A-3.1 Procedure — Take about 10 g of the material, accurately weighed, and cut it into small pieces. Transfer all the cut material into a beaker containing 400 ml of water previously heated to 90°C. Stir well and allow to stand for 18 hours with suitable precautions against contamination with atmospheric impurities. Stir again and filter, rejecting the first 25 ml of the filtrate. Determine the *p*H of the filtrate by any suitable method.

A-4. DETERMINATION OF ASH

A-4.1 Procedure — Incinerate about 5 g of the sample of the material to ash in a muffle furnace. Express the ash as a percentage of the mass of the tracing cloth taken for the test.

A-5. DETERMINATION OF TRANSPARENCY

A-5.0 General — Transparency of the material may be determined by one of the two types of apparatus mentioned below, namely:

a) an improvised set-up using a photoelectric exposure meter, or

b) a densitometer.

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*Specification for atmospheric conditions for testing (*revised*).

Either of the instruments may be used for the measurement of transparency but in case of dispute the results obtained by the use of a densitometer shall be accepted.

A-5.1 Apparatus

A-5.1.1 The improvised set-up is shown in Fig. 1. It consists essentially of the following components:

a) An adjustable light-proof box consisting of a 60 watt frosted bulb functioning as the light source which is mounted horizontally at one end of the box. The other end of the box has window for insertion of the sample; and

b) A multi-range photoelectric exposure meter with its hood off.

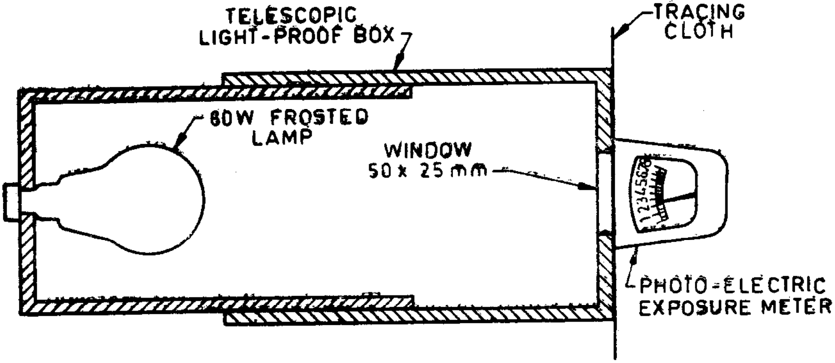

FIG. 1 TEST APPARATUS FOR DETERMINATION OF TRANSPARENCY OF TRACING CLOTH

A-5.1.2 *Transmission Densitometer* — It consists of two parts, namely, a measuring head and an indicating unit. The indicating unit is calibrated directly in density and in illumination. The measuring head consists of the light source and a vacuum photo-cell. The light from a low voltage bulb is roughly collimated by a lens system and is passed through a diaphragm, with the given aperture, which forms the window for the insertion of sample. The photo-cell is carried by a hinged arm which is lowered on to the sample. The greater part of the light passing through the sample is collected by a white integrating cone at the top of which is a diffusing screen and the photo-cell.

A-5.2 Procedure

A-5.2.1 *Initial Transparency* — Follow the manufacturers' instructions for the apparatus strictly making prescribed adjustments, and when prepared for test, read the illumination from the meter with the window open and without the sample inserted in it. Place the specimen to be tested against the window and read the value again. Note both the readings. Test each sample at three places at least one of which should be at the edge. Multiply the ratio of the final to the initial readings by 100 and express this as percentage transparency. If the initial reading is 100, the final reading gives directly the percentage transparency of the specimen. Each individual test result shall comply with the specified value.

A-5.2.2 *Transparency After Heat Ageing* — Age a test specimen of the material in an air-oven for 72 hours at 100°C and determine its percentage transparency after conditioning in an atmosphere of 65 ± 2 percent relative humidity and at a temperature of 27 ± 2°C in the same manner as under **A-5.2.1**.

NOTE 1 — When testing by the improvised set-up, the photoelectric exposure meter should be placed very close to the surface of the sample being tested. After the initial reading, the position of the sensitive surface of the exposure meter relative to the window shall not change till the final reading with the specimen inserted has been noted down.

NOTE 2 — The photoelectric exposure meter shall be calibrated at intervals and shall never be exposed to damp atmosphere and very high illumination.

NOTE 3 — The improvised set-up shall be provided with mounts to hold the sample in a stretched condition to eliminate the wrinkled or curved surfaces.

A-5.3 Procedure for Transparency After Heat Ageing — Age a test specimen of the material for 72 hours at 100°C and determine its transparency, after conditioning in an atmosphere of 65 ± 2 percent relative humidity and at a temperature of 27 ± 2°C (*see* IS : 196-1966*) in the manner under **A-5.2**.

A-5.3.1 Express the transmission coefficient as a percentage which gives the figure for transparency after heat ageing.

A-6. INKING AND ERASING TESTS

A-6.0 General

A-6.0.1 This is a performance test which is carried out by a qualified draughtsman. By drawing and erasing lines on the tracing cloth its likely performance under actual use is determined.

A-6.1 Procedure — Draw four lines of various thicknesses up to but not exceeding 0·4 mm, 5 mm apart (*see* IS : 696-1972†) on a surface prepared by French chalk, with a ruling pen using drawing ink, conforming to IS : 789-1971‡. After 15 minutes, erase these lines with a tracing

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*Specification for atmospheric conditions for testing (*revised*).

†Code of practice for general engineering drawings (*second revision*).

‡Specification for ink, drawing, waterproof, black (*first revision*).

cloth eraser rubbing along the lines and dress down the erased surface with soft pencil eraser. Similarly, draw four lines approximately at right angles to originally drawn lines on the erased area. Erase these lines as before after 15 minutes.

A-6.1.1 *Buffer Reading* — Take ammonia paper of any make and tracing cloth (without any erased surface) from test at **A-6.1**. Expose the same on any apparatus meant for exposure. Note down the time required for complete exposure so as to get contrast of drawn lines when developed in ammonia vapours. This time shall be buffer reading. Time required for buffer reading shall be taken as standard for taking further readings.

NOTE — Buffer reading is simply a device to cancel inevitable variations in test results which are due to minor variations between laboratories in equipment, materials and time of exposure.

A-6.1.2 Expose the erased sample on ammonia paper under similar condition and for same time as for buffer reading as described in **A-6.1.1**. Care shall be taken to leave an equivalent portion (equivalent to test area) of the tracing cloth blank, in order to compare the whiteness of the test area with the remaining portion exposed at the same time under similar conditions. Develop this sample in ammonia vapours.

A-6.2 Performance — The sample shall be considered satisfactory provided:

a) No ghost lines appear on erased surface;

b) The lines drawn come out clearly in contrast on development; and

c) The whiteness of the test surface is similar to buffer reading surface of ammonia paper and to the blank area tested.

NOTE — In case of dispute, this test shall be conducted by using the following materials:

a) Rotring pen;

b) Waterproof ink (Camlin Brand);

c) Swastik's sandow's tracing cloth eraser; and

d) Ammonia paper (Torch Brand).

APPENDIX B

(*Clause* 6.1)

SAMPLING OF TRACING CLOTH

B-1. SCALE OF SAMPLING

B-1.1 Lot — In any consignment, all the rolls of the same size and drawn from a single batch of manufacture shall constitute a lot.

B-1.1.1 The conformity of the lot to the requirements of the specification shall be ascertained for each lot separately. The number of rolls to be selected for this purpose shall be as given below:

Lot Size N	*No. of Rolls to be Selected* n
(1)	(2)
Up to 50	2
51 „ 100	3
101 „ 200	4
201 „ 300	5
301 and above	7

B-1.1.2 The rolls shall be selected at random and to ensure randomness of selection, the random number table (*see* IS : 4905-1968*) shall be used. In case random number tables are not available, the following procedure may be adopted:

> Starting from any package, count all the packages in the lot as 1, 2, 3........, etc, up to r and so on, where r is the integral part of N/n, in which N is the number of packages in the lot and n the number to be sampled. Every rth package thus counted shall be withdrawn to constitute the sample.

B-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

B-2.1 One square metre of tracing cloth shall be taken from all the rolls selected in **B-1.1** to constitute the test sample, care being taken to exclude about 0·25 m length of tracing cloth from either end. The test specimens (not less than 5 cm wide) necessary for the various tests specified in this standard, shall be collected from the square metre of tracing cloth thus obtained.

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*Methods for random sampling.

B-2.2 Each one square-metre piece got from a lot shall be examined for basic fabric, coating and thickness and, if found satisfactory, further tests as specified in **B-2.3** and **B-2.4** shall be carried out.

B-2.3 Tests for the determination of initial transparency and transparency after heat ageing, moisture regain, breaking load and inking and erasing tests shall be conducted on each test specimen cut from one square-metre pieces as obtained under **B-2.1**.

B-2.4 Identical test specimens, cut from all the one square-metre pieces, shall be pooled together on which tests for the determination of mass of basic fabric, ash content and *p*H of aqueous extract shall be conducted.

B-2.5 The lot shall be declared as conforming to the specification requirements of various characteristics under the following conditions:

a) For each of the characteristics listed in **B-2.3**, the test results on all the specimens shall satisfy the relevant requirements specified in col 3 of Table 1; and

b) For the remaining characteristics which have been evaluated according to **B-2.4**, the test results shall satisfy the relevant requirements specified in col 3 of Table 1.

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(*Page* 9, *clause* **A-6.1**, *line* 3) — Substitute 'Tailoring chalk' *for* 'French chalk'.

[*Page* 10, *clause* **A-6.2**, *Note*(c)] — Substitute 'Commercially available' *for* 'Swastik's sandow's'.

(PCD 13)

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